

# Developments in the production of economics PhDs at four research-intensive universities in South Africa

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There is a national drive to increase PhD production, yet we know little about how this imperative takes shape within different disciplines. We therefore set out to explore recent developments and the current status of the PhD in economics at four South African research-intensive universities. A data set of all economics PhDs produced in these commerce faculties during the period 2008–2014 was analysed to determine whether the departments of economics responded to the call for increased doctoral production, and the role the PhD by publication might have played in the process. How an increase in quantity might influence doctoral education in the respective academic departments was also considered by supplementing the quantitative data with perspectives from heads of department at the four institutions. The notable increase in doctoral production over the time period studied shows that national and international trends have influenced doctoral education in economics departments within South African research-intensive universities. Increased usage of the PhD by publication has implications for policy and pedagogical practice within these departments, especially as there seems to be limited available supervisory capacity. Other changes in departmental practices, such as the entrenchment of a research culture and the promotion of collaborative research amongst students and staff, also contributed to maintain quality in doctoral education.

### Significance:

- A substantial increase in the quantity of economics PhDs produced was accompanied by an unexpected increase in quality.
- The increase in quality related to management changes, including a move to the PhD by publication, increased attention to ensuring the quality of students allowed entry to PhD programmes, facilitation of full-time doctoral studies through funding arrangements, and the appointment of international faculty with a research orientation.

## Introduction

*Tradeoffs have long been at the centre of economics. The aphorism ‘there is no such thing as a free lunch’ captures a central economic idea: you cannot get something for nothing. Among the many tradeoffs emphasised by economists are guns v butter, public v private, efficiency v equity, quality v quantity or cost and short-term v long-term performance [emphasis added].<sup>1</sup>*

The quality versus quantity debate currently lies at the centre of national debates on the production of PhDs. The Academy of Science of South Africa (ASSAf) report<sup>2</sup> was the first comprehensive report on PhD training in South Africa. It covered the period from 2000 to 2007 and called for an urgent increase in the quantity of ‘high-quality PhDs’ produced in South Africa. The call for a national increase in doctoral production is echoed by the National Planning Commission of South Africa that envisions the nearly threefold increase in production of doctorates to 5000 doctoral graduates per year by 2030, while the National Development Plan of South Africa envisages that 70% of all academic staff employed at universities in South Africa will have doctorates within the same period of time (nearly double the current 40%).<sup>3</sup> The figures seem to emphasise quantity over quality, which has raised concerns over a production-focused mode of doctoral education within the academic community.<sup>4-8</sup>

It is not only the South African context that is important for this study. Internationally, universities are stepping away from their traditional role as leaders of knowledge production to being profit-seeking businesses. A finance-driven approach to university governance and practice underscores this trend globally.<sup>9</sup> Academics as cogs in a research and teaching production line militate against ‘passionate scholarship’ and research runs the risk of becoming repetitive and mundane.<sup>10</sup> PhD policies, pedagogical practices, and the eventual outputs produced – including the chosen thesis format – are arguably influenced by these trends. It is thus not surprising that there has been a notable diversification in PhD-related policies, pedagogical approaches and formats across and within institutions and disciplines. One such noteworthy change is a shift away from the traditional monograph PhD to the PhD by publication. The numbers of PhDs by publication are growing internationally.<sup>11</sup> Boud and Lee<sup>12</sup> note ‘the rapidly expanding doctorates by publications that are a visible response to policy-led pressures for research productivity within the “performative” university’. A major reason for the attractiveness of this path to the PhD is higher education funding models that reward both publications and research student completion<sup>13</sup> – as is the case in South Africa.

However, South Africa sports an unequal institutional playing field in terms of producing doctorates and therefore it becomes difficult (and even unfair) to compare the doctoral production at all the higher education institutions. The ASSAf report<sup>2</sup> found that the top nine public education institutions in South Africa produced 83% of all doctorates in 2007. The top four universities, according to the report, were the University of Cape Town (11%), the University

of Pretoria (13%), Stellenbosch University (12%) and the University of the Witwatersrand (11%). Together, these four universities produced 47% of all new doctorates in South Africa in 2007 (and 57% of all new doctorates produced excluding those by universities of technology). PhD production at these four universities is likely to have responded to these pressures on doctoral education. As the choice of PhD thesis format is deeply embedded within pedagogical practices and influenced by policy directives, and may be interpreted in terms of both the quantity of PhD output and the quality of the doctoral education experience, it is important to explore how the phenomenon of thesis format plays out within particular disciplinary environments. Although it is relatively easy to measure the quantity of doctoral output (provided that complete data sets are available), the quality of such output is rather more difficult to measure in any discipline (including economics with its multiple sub-disciplines). But quality does not only have to refer to the actual output produced; it can also refer to doctoral education itself – that which is experienced and enacted by the supervisors and students within the discipline. In this article we take the latter position, as only subject experts (the examiners of the PhDs) can really judge the quality of a thesis. We are not subject experts in the fields in which the included theses in our data set were produced, but as all these theses served as evidence of completed doctorates, we assumed that they must have met at least the minimum standards in terms of quality within the broader discipline of economics.

The disciplinary environment of economics forms a useful context for such analyses as PhDs in economics have an important role to play within the national doctoral scenario in which 'education, economic and management sciences, and religious studies' produced the largest share of all doctorates.<sup>2</sup> Economics departments produced the bulk of the doctorates within the commerce faculties in our data set. A discipline-based analysis may therefore provide interesting insights as Becher and Trowler<sup>14</sup> argue that academic communities are characterised by distinctive discipline-based cultures that influence their practices. Disciplines, such as economics, have ethnocentric views and thus respond differently to stimuli.

If economics doctorates have become 'commodified inputs' in a national PhD production process,<sup>10</sup> not only of research but also of PhD students, then pressure for increased output with the same input is to be expected. All else being equal, a reduction in the quality of doctoral education may result. Similar logic also leads to a hypothetical expectation of fewer supervisors per thesis. The ASSAf report<sup>2</sup> indicated that the traditional apprenticeship model of doctoral supervision, currently predominant at South African universities, might not be able to support the required increase in numbers. There are a variety of possible responses to such pressures, including (amongst others) a cohort approach<sup>15</sup> and the PhD by publication. A move towards the PhD by publication format may suggest a change in the purpose behind a PhD. Samuel<sup>16</sup> suggests that the purpose for which a PhD is undertaken has significant attributional implications. This may well extend to the lens through which quality is perceived. What the economics discipline associates with PhD thesis quality, and whether increased use of the PhD by publication form is shifting the goal posts, are addressed in this paper.

The ASSAf report, combined with a discipline-specific understanding of the study environment, thus forms the foundational rationale for this enquiry. Did the departments of economics at the top four universities respond to the call for increased doctoral production? And did the PhD by publication play an important role in a potential increase? How might an increase in quantity influence the quality of doctoral education within these academic settings? The first two quantity-orientated questions are answered by analysing a data set built from PhD theses obtained from the institutional repositories of the four universities (Phase 1). Quality of the doctoral education within these settings is explored with open-ended questionnaires to the former heads of department (Phase 2).

This paper is one of few to explore the production of PhDs in detail in one discipline. Moreover, it allows for a comparison between the economics departments at the four selected research-intensive universities in South Africa in terms of supervisory performance; this type of comparison has not been attempted before. Such discipline-specific

analyses across institutions provide useful insights into the nature of the doctorate as it manifests within and across contexts. This is of interest not only to economics academics who are responsible for implementing policies and making informed pedagogical choices, but also to prospective doctoral students in economics as they make choices in terms of institutions, supervisors, programmes and formats. Compared to the ASSAf report, this paper presents and analyses data on PhDs produced in South Africa in the field of economics for an updated period.

## Literature review

The increasing importance of a flexible 'knowledge economy' as an imperative for future economic growth seems to have sparked a worldwide interest in and consequent investment in the generation of knowledge in the form of doctorates. The South African government, under pressure to improve South Africa's economic growth rate, seems to expect much from the eventual dividends associated with the production of more doctorate degrees. The Carnegie Foundation and National Research Foundation of South Africa have reached broad consensus that Africa, in particular, needs 'thousands' of PhDs in order to replace an aging professoriate to serve increased student numbers in an ever more massified higher education system.<sup>2,17</sup>

At the same time, South Africa faces its own unique set of challenges and impediments involved in the journey to produce more doctorates. Cloete et al.<sup>17</sup> identified four imperatives to which doctoral production in South Africa may be subjected: growth, efficiency, transformation and quality. The present discourses concern the current status and approaches thought to be necessary to achieve each of these imperatives and, of importance, they also concern the inevitable goal to reconcile these imperatives while limiting trade-offs amongst them.

Despite the pressing need for research concerning the production of more doctorates in South Africa, research on the topic seems scant. Wolhuter<sup>18</sup> and Mouton et al.<sup>19</sup> argue that almost no quantitative studies with this focus are available. Until recently, even less research seems to have been available concerning the production of doctorates in the individual academic discipline fields, especially in economics. The only papers found were Zarenda and Rees<sup>20</sup> on economics education in general, and Hosking<sup>21</sup> on the costs and benefits of doctoral education in economics in South Africa using a case study approach.

Discipline-focused research into doctorate production in South Africa was recently advanced with an explorative quantitative study by De Jager and Frick<sup>22</sup>. This study showed a low rate of doctorate production in the accounting sciences, which was attributed to a chronic lack of supervisory capacity in accounting departments, underscored by few staff at the required professorial level. However, an increased research orientation in South African university accounting departments, albeit from a low base, was also found.

Conversely, it seems a plausible expectation that the production of doctorates in economics would have reacted quicker than other fields to Cloete et al.'s<sup>17</sup> imperatives of growth, efficiency and transformation, as the literature shows economists to have internalised rational profit-maximisation as the main device to be used for decision-making.<sup>23,24</sup> Fields other than economics might be slowed down in their decision-making by the consideration of factors outside the profit-maximisation framework. The same profit-maximisation logic is also used to explain the move in economics to the PhD by publication as 'the essay format allows students to avoid the effort to convert a treatise into multiple journal papers'<sup>25</sup>. However, we also acknowledge that economics departments do not function in isolation from the rest of the university community, and therefore institutional imperatives (which may or may not be drivers of change) may be more determining than disciplinary idiosyncrasies.

Based on the foregoing rationale, we investigated the current state of production of PhDs in economics in South Africa, with an emphasis on quantitative information. We expected to find an increase in PhD numbers, possibly at the expense of doctoral education quality. It is of course possible that efficiency gains compensate for a potential decrease in such quality. One such possible efficiency gain is the greater use of the PhD by publication format. Furthermore, we also consequently gained

useful insights or views on the current research culture at economics departments, with the eventual possibility of replicating good practices in other South African economics departments.

## Research approach

The research strategy was interpretive, with the objective of describing recent trends in the production of economics PhDs in South Africa. The focus was to describe what is happening, rather than how it might be explained, as the area is not well known. Once a clear description of this area became available, the focus could shift to more explanatory approaches.

An explanatory sequential mixed-method research design was employed. Inferences from the initial quantitative phase of the study (secondary data analysis) were then combined with inferences from the qualitative phase (open-ended questionnaires).

### *Phase 1: Quantitative data analysis*

#### University sample selection

South Africa has 26 public higher education institutions that can be divided into three categories: 14 universities, 6 comprehensive universities and 6 universities of technology. The University of Cape Town, the University of Pretoria, Stellenbosch University and the University of the Witwatersrand are the top four universities based on PhD production and rankings. The Centre for Higher Education Transformation clusters these four universities together as high performers based on an analysis of their inputs and outputs.<sup>26</sup> The four universities are the leading South African research universities according to the 2015 QS World University Rankings. They are also the highest-rated South African universities according to the 2015 Times Higher Education World University Rankings, apart from the University of Pretoria, which is rated fifth after the University of KwaZulu-Natal. Doctorates produced collectively by these universities are thus expected to be representative of the doctorates produced in South Africa, even though the sample obviously does not include all the doctorates produced in the country.

#### Data and method

Institutional repositories of doctoral theses at the four universities (at Stellenbosch University the terminology is doctoral dissertation and master's thesis) were used to access doctoral theses for all commerce faculties (including business schools) for the period from 2008 to 2014. This choice of time period was motivated by the fact that Stellenbosch University began uploading all doctoral theses to their public repository only in 2008. The data reported in the ASSAf report<sup>2</sup>, which at present is arguably the most comprehensive published report on the status of the PhD in South Africa, only included the period from 2000 to 2007. This paper should therefore provide a focused analysis of subsequent trends. The list of theses downloaded was reconciled to the graduation records of the four universities for completeness.

The following data were obtained from each doctoral thesis:

- the year of graduation;
- the name of the student;
- the title of the thesis;
- the academic department;
- the university affiliation;
- the names and affiliations of the supervisors;
- the type of doctoral degree (PhD/DCom);
- the number of words in the title;
- the total number of pages (as included in the pdf file);
- the number of chapters; and
- whether the doctorate was by monograph or by publication.

Determination of 'by publication' was based on an analysis of the title, the index, the abstract and chapter one of each thesis. A 'by publication' doctorate is structured as a number of papers with a global introduction and conclusion. By implication, the literature review and research approach are not separate chapters as in a monograph but are rather spread across the different papers.

It must be emphasised that only publically available information was gathered. Universities are not willing to share additional data, such as the number of years a student was registered or the personal information of students, due to privacy concerns related to the *Protection of Personal Information Act*.<sup>27</sup>

Despite several difficulties encountered in collecting the data, including missing records and limited online search functionality, repository and graduation records were ultimately reconciled. Economics theses were identified and extracted from the larger combined commerce faculty collection based on departmental affiliation. The data gathered enabled the analysis of quantity trends in PhD production, as well as the identification of some characteristics of those PhDs. Comparisons between the economics group of PhDs and the rest of the commerce faculty group of PhDs were possible. Comparisons between the four universities were also possible.

### *Phase 2: Questionnaires*

Only tentative inferences about the quality of doctoral education are possible with the quantitative data. To deepen our understanding of what is happening in the production of economics PhDs in South Africa we sent open-ended questionnaires to the former heads of the four departments included in this study; the respondents were thus heads of department (HODs) for most of the 2008 to 2014 period when the theses included in the study were produced. All four purposively selected respondents responded positively to our request to participate. Ethics clearance was obtained from the University of Cape Town's Commerce Faculty Ethics in Research Committee before sending out the questionnaires (reference number: 0210201501). Informed consent was obtained from each respondent. The responses to the questionnaires enabled a triangulation of inferences based on different sources of information. The questions are available in the Appendix. The responses were analysed by means of conventional content analysis, as described by Hsieh and Shannon<sup>28</sup>.

## Results

### *Quantity of PhDs produced*

Table 1 details the number of doctorates produced per university for each of the 7 years under review, in economics and within each commerce faculty. Table 1 also indicates the percentage of the economics PhDs that were by publication.

Table 1 shows an increase in the total number of economics PhD graduates who graduated annually over the studied period. At the same time the use of the PhD by publication format grew: in 2013, almost 70% of all PhDs in economics were in this format. The PhD by publication format has become entrenched and seems to be growing rapidly in uptake as most economics PhDs in 2013 and 2014 were in this format in all of the four universities studied. This finding accords with international experience as 65% of economics PhDs in the USA for the period 2001 to 2002 were in this format.<sup>25</sup>

Economics PhD graduates formed a significant part of the total commerce faculty cohort of doctoral graduates, indicating the relative importance of economics as a producer of doctorates within the larger commerce field. The percentage of the faculty doctorates from economics was relatively stable between the beginning and end years of observation, implying that economics PhD output grew at about the same pace as faculty doctorate output.

Of the four universities, the University of Cape Town produced the highest number of economics PhDs. The numbers graduated seem to have grown, albeit at a slower pace than the numbers graduated in the faculty as a whole as indicated by the percentage of the faculty's doctorates from economics indicator.

Table 1: Total PhDs in economics produced in the years 2008 to 2014 at the Universities of Cape Town, Pretoria, Stellenbosch and the Witwatersrand

Year	Cape Town				Pretoria				Stellenbosch				Witwatersrand							
	Economics	% Economics by publication	Faculty	% Faculty by economics	Economics	% Economics by publication	Faculty	% Faculty by economics	Economics	% Economics by publication	Faculty	% Faculty by economics	Economics	% Economics by publication	Faculty	% Faculty by economics				
2008	12	25%	44	27%	4	50%	7	57%	5	0%	24	21%	1	0%	11	9%	2	50%	2	100%
2009	9	44%	44	20%	7	43%	19	37%	2	50%	21	10%	0	NA	4	0%	0	NA	0	NA
2010	11	36%	42	26%	7	57%	17	41%	0	NA	7	0%	0	NA	12	0%	4	0%	6	67%
2011	26	31%	69	38%	8	63%	18	44%	9	0%	25	36%	3	33%	15	20%	6	33%	11	55%
2012	21	29%	64	33%	10	20%	26	38%	3	67%	15	20%	5	20%	16	31%	3	33%	7	43%
2013	15	67%	55	27%	7	71%	14	50%	5	80%	28	18%	1	0%	7	14%	2	50%	6	33%
2014	20	55%	73	27%	6	67%	16	38%	8	50%	29	28%	6	50%	16	38%	0	NA	12	0%
<b>TOTAL</b>	<b>114</b>	<b>40%</b>	<b>391</b>	<b>29%</b>	<b>49</b>	<b>51%</b>	<b>117</b>	<b>42%</b>	<b>32</b>	<b>34%</b>	<b>149</b>	<b>21%</b>	<b>16</b>	<b>31%</b>	<b>81</b>	<b>20%</b>	<b>17</b>	<b>29%</b>	<b>44</b>	<b>39%</b>

The data were sourced from the public repositories of these four universities. PhDs by publication were identified based on self-classification by the student or the format of the thesis.

However, the School of Economics at the University of Cape Town was a more significant contributor to the doctoral output of the commerce faculty (42% on average) than the other three departments of economics sampled (29% on average for the four universities combined). A high and increasing percentage of the economics PhDs at Cape Town were in the PhD by publication format.

The second-highest number of economics PhDs was produced at the University of Pretoria. Of the four universities, the University of Pretoria's commerce faculty produced the most commerce doctorates. However, the percentage of economics PhDs in the commerce faculty was the second lowest of the four universities at 21%, but stable. The number of economics PhDs at the University of Pretoria grew during the study period. A lower average percentage of the PhDs was in the PhD by publication format compared with the four universities combined; however, this trend seems to be changing when looking at the data for the period 2012 to 2014.

The commerce faculty at Stellenbosch University produced the second-lowest number of doctorates overall. That faculty also produced the lowest overall number of economics PhDs. The contribution from economics PhDs to faculty doctorates was the lowest at Stellenbosch University of the four universities on average. However, the number of economics PhDs grew steadily over the period under review. A fast-growing percentage of the economics PhDs was in the PhD by publication format at Stellenbosch University.

The University of the Witwatersrand produced the second-lowest number of economics PhDs in total. Also, the total number of doctorates at faculty level was the lowest of the four universities. A notable, but declining, contribution came from economics. A firm percentage (29%) of the economics PhDs at the University of the Witwatersrand were by publication.

The PhDs in economics produced at the four universities were concentrated amongst particular supervisors. Supervisor A at the University of Cape Town produced the most (10) PhDs and Supervisor B at the University of Pretoria produced the second-most (nine) PhDs during the period. Supervisor C at Stellenbosch University, Supervisor D at the University of Pretoria and Supervisor E at the University of the Witwatersrand produced six PhDs each during the period. This concentration raises important quality-related questions about the doctoral education practices within these departments, as such supervisors might have been overloaded. Given the aging of productive supervisors, and the relatively low percentage of doctorated academic staff within the South African university system in general, this result is not necessarily surprising – but it does bring into question how more and younger supervisors are supported whilst not compromising on the quality of doctoral education.

This perspective on quantity should not be divorced from other aspects of the doctorates under consideration, such as the quality of doctoral education. Although the selected attributes presented below cannot be seen as accurate indicators of the quality of doctoral theses, they do provide an interesting perspective on trends in economics doctoral thesis inputs (doctoral education) and outputs (theses).

### Selected attributes of the economics PhDs

Table 2 details the evolution of the average number of supervisors per economics PhD and commerce faculty doctorate per year. Three length indicators are detailed per economics PhD and commerce faculty doctorate per year and per university: average number of pages, average number of chapters and average number of words in the title. Table 3 details the 20 most common words used in the titles of the economics PhDs versus the 20 most common words used in the titles of the other commerce faculty doctorates.

Table 2 indicates that the overall mean number of supervisors for the economics PhDs was almost the same as the overall mean number of supervisors for the rest of the commerce faculty doctorates. However, the overall mean number of supervisors differed strongly between universities, both for the economics group and the rest of the commerce faculty group. The Universities of Cape Town and the Witwatersrand clustered together with a lower number of supervisors per doctorate

compared to the number for Pretoria and Stellenbosch universities. On a per-year level, it seemed as if the mean number of supervisors per economics PhD decreased, whilst for the rest of the commerce faculty doctorates it stayed stable or was even slightly increasing.

In terms of page length of the thesis, the economics PhD was significantly shorter than those from the rest of the commerce faculty for each of the years under review as well as overall. The average page length was significantly different among universities for the economics group but not for the rest of the commerce faculty group. The economics PhDs at the University of Pretoria were much shorter on average than those at the other three universities. On a per-year level the average number of pages per economics PhD decreased, whilst for those from the rest of the commerce faculty, the number of pages stayed stable. The average number of chapters in economics PhDs was significantly shorter than those in PhDs from the rest of the commerce faculty, overall and for four of the years under review. The average number of chapters was not significantly different between the universities for the economics group and for the rest of the commerce faculty group. On a per-year level, it seems as if, for the last two years under review, the number of chapters per PhD decreased in economics, whereas it remained stable for PhDs from the rest of the commerce faculty. In terms of title length, the economics PhD group produced significantly shorter titles than the rest of the commerce faculty group overall and for three of the years under review. The average length of PhD title at Stellenbosch University was significantly longer than those at the other universities for the economics PhD group. On a per-year level, the average title length of economics PhDs increased, whereas it remained stable for PhDs from the rest of the commerce faculty.

Table 3 indicates that both economics PhDs and the rest of the commerce faculty doctorates were mostly contextually situated to South Africa and Africa. There was a 35% overlap between the common words used in the titles of the economics PhDs and the common words used in the titles of the rest of the commerce doctorates. The word 'essays' was used in 16 out of the 114 economics titles (for example, 'Three essays on...'). Such a title was interpreted to indicate the PhD by publication format.

This analysis of selected attributes of the doctorates shows that the increase in the quantity of economics PhDs was accompanied by a decrease in the number of supervisors, as well as decreases in the number of pages and chapters. However, this was not the case for the rest of the commerce faculty. These results, which could be interpreted as negative for the quality of doctoral education, could also be interpreted as indicating an improvement in the quality of doctoral education: that is, the number of supervisors in economics might have reduced because of a new cohort approach to PhD supervision or the number of pages (and chapters) might have reduced because economics PhD students became more concise in their writing. Conciseness is a characteristic of high-quality writing.<sup>29,30</sup> Although the quantitative data cannot be used to distinguish between these opposing possibilities, this quandary does warrant further inquiry.

### Multivariate analysis

Our overall data set contained both economics PhDs and doctorates from the rest of the commerce faculties, which afforded us the opportunity to investigate any factors distinguishing the economics PhDs from the rest of the commerce faculty doctorates in a multivariate environment. We made use of a logit regression as the dependent variable was binary. Possible explanatory variables identified were: the university; the year of

**Table 2:** Selected attributes of the 114 economics PhDs produced versus the 277 PhDs produced by the rest of the commerce faculty

Year	Length indicators							
	Number of supervisors		Number of pages		Number of chapters		Number of words in title	
	Economics combined	Faculty†	Economics combined	Faculty†	Economics combined	Faculty†	Economics combined	Faculty†
2008	1.417	1.281	225.750***	323.250	7.000	7.719	10.667*	13.594
2009	1.333	1.257	227.222***	325.314	6.778	7.086	13.778	16.057
2010	1.273	1.258	180.727***	311.645	5.545***	7.742	10.364**	13.581
2011	1.385	1.279	190.577***	324.738	6.385**	7.500	10.769**	12.814
2012	1.095	1.209	239.900**	298.310	6.800	7.024	13.762	13.628
2013	1.267	1.475	226.286***	322.079	5.857***	7.632	10.133	10.275
2014	1.300	1.321	207.158***	322.660	6.000***	7.547	11.700	12.679
<b>Total</b>	<b>1.289</b>	<b>1.300</b>	<b>212.604***</b>	<b>318.311</b>	<b>6.342***</b>	<b>7.454</b>	<b>11.588***</b>	<b>13.134</b>
Cape Town	1.082	1.162	212.417	296.908	6.292	7.292	11.653	15.206
Pretoria	1.656	1.359	172.667	332.188	6.333	7.479	10.125	12.111
Stellenbosch	1.375	1.385	247.625	321.308	6.750	7.738	15.188	12.877
Witwatersrand	1.118	1.185	250.647	301.311	6.118	7.038	10.765	12.963
Different: Anova F-test	0.000	0.018	0.001	0.101	0.750	0.363	0.003	0.002
Different: Welch F-test	0.000	0.013	0.003	0.107	0.812	0.249	0.041	0.022

The data were sourced from the public repositories of the four universities.

†Excluding economics.

Statistically significant differences are shown between the mean for the economics PhDs versus the mean for the remainder of the commerce faculty doctorates at the 10% (\*), 5% (\*\*) and 1% (\*\*\*) levels. In the blocked section at the bottom of the table the overall average per variable is decomposed into an average of that variable per university. The Anova F-test and Welch F-test indicate whether these university differences are statistically significantly different from each other.

**Table 3:** Word frequencies (top 20) in the titles of doctoral theses at the Universities of Cape Town, Pretoria, Stellenbosch and the Witwatersrand

Economics			Rest of faculty		
Word	Count	Weighted %	Word	Count	Weighted %
<b>africa</b>	<b>42</b>	<b>4.34</b>	<b>south</b>	<b>104</b>	<b>3.96</b>
<b>south</b>	<b>41</b>	<b>4.24</b>	<b>africa</b>	<b>73</b>	<b>2.78</b>
economic	26	2.55	<b>african</b>	<b>56</b>	<b>2.13</b>
<b>modelling</b>	<b>19</b>	<b>1.96</b>	<b>development</b>	<b>67</b>	<b>2.12</b>
<b>african</b>	<b>18</b>	<b>1.86</b>	<b>model</b>	<b>41</b>	<b>1.56</b>
<b>policy</b>	<b>18</b>	<b>1.79</b>	study	50	1.39
essays	16	1.65	management	39	1.37
<b>market</b>	<b>16</b>	<b>1.65</b>	evaluation	45	1.36
value	17	1.47	governance	57	1.35
financial	14	1.45	role	34	0.97
monetary	13	1.34	public	32	0.97
outcomes	16	1.29	business	26	0.88
growth	16	1.24	case	25	0.86
poverty	11	1.14	<b>market</b>	<b>23</b>	<b>0.84</b>
analysis	10	1.03	systems	35	0.81
evidence	10	1.03	performance	25	0.78
education	13	0.93	based	27	0.76
countries	9	0.88	effects	30	0.74
<b>development</b>	<b>16</b>	<b>0.88</b>	work	39	0.71
dynamics	8	0.83	<b>policy</b>	<b>19</b>	<b>0.67</b>

The data were sourced from the public repositories of the four universities. Words in bold indicate overlap between the two groups.

graduation (as economics PhDs in total seemed to be increasing, the variable was defined as a dummy variable equal to one if the graduation year was 2012, 2013 or 2014); the format (by publication or not); the supervisor (the variable was defined as a dummy variable equal to one if the supervisor was the supervisor of more than five doctorates in our data set); the number of supervisors; the number of pages; the number of chapters; and the number of words in the title. The full model was estimated and any insignificant variables were dropped from it, starting with the most insignificant variable. Table 4 details the resulting final model.

Table 4 demonstrates that in a multivariate environment there was not a statistically significant increase in economics PhDs compared to the rest of commerce faculty doctorates as the dummy variable was dropped from the final regression. The most productive supervisor dummy variable was also dropped from the final regression and so the mere fact that a student was supervised by a productive supervisor did not uniquely identify the doctorate as one from economics. The number of supervisors was also dropped from the final regression. Of the length variables, only the number of pages of the thesis came through as a significant predictor of an economics PhD in the final model.

The final model can be interpreted as follows. The base case is an economics PhD at the University of Pretoria. If it is known that the thesis format is by publication then the probability of the doctorate being an economics PhD increases by 19.4%. If it is known that the student is not from the University of Pretoria and rather from Stellenbosch University

then the probability of the doctorate being an economics PhD is unchanged from the probability of the University of Pretoria. If it is known that the student is not from the University of Pretoria and rather from the University of Cape Town then the probability of the doctorate being an economics PhD increases by 12.5%. If it is known that the student is not from the University of Pretoria and rather from the University of the Witwatersrand then the probability of the doctorate being an economics PhD increases by 18.2%. Finally, a shorter thesis is more likely to be an economics PhD; a one-page increase in length (compared to the mean page length of 288 pages) was associated with a 0.3% decrease in the probability that a doctorate is in economics.

The quantitative data analysis confirms that the quantity of economics PhDs is increasing, that the format is changing away from the monograph PhD to the PhD by publication and that the form of the economics PhDs is showing trends that are different from the rest of the commerce faculty. Experts within the discipline were approached to gain a perspective on the quality of these changes.

**Table 4:** Final logit regression model that distinguishes between economics PhDs and PhDs produced in the rest of the commerce faculty

Regressand: Economics=1			
Regressor	Coefficient	Z-statistic	Marginal effects
Constant	2.144	4.119***	
By publication=1	0.987	2.961***	0.194103985
Cape Town=1	0.636	2.113**	0.125076124
Witwatersrand=1	0.925	2.200**	0.181911029
Page length	-0.014	-7.094***	-0.002753248
Observation with Economics=0	273		
Observation with Economics=1	111		
N	384		
McFadden R-squared	0.272		
Probability (LR statistic)	0.000		

The data were sourced from the public repositories of the four universities.

Marginal effects were derived from the model coefficients and the means of the variables. The base case was an economics PhD at the University of Pretoria.

Statistically significant coefficient at the 5% (\*\*) and 1% (\*\*\*) levels.

### Questionnaires and discussion

Former HODs, who served for most of the period of the study (2008–2014) in the four economics departments, were asked to reflect on the PhD production processes in their respective departments.

The HOD respondents identified building a research culture and developing departmental research capacity as the main drivers behind the increased PhD production noted in the quantitative data. The HOD respondents were divided on whether their respective departments had mature research cultures that could support increased PhD production. Most respondents were convinced that this was the case, but even the one respondent who did not share this view indicated that there had been substantive improvements over the past 5 years. The main factors that contributed towards the establishment of a mature research culture within departments were: attracting international and esteemed scholars (with PhDs) onto the permanent staff complement; providing staff members with international exposure (through research seminars and/or overseas study opportunities); prioritising and incentivising research (rather than private consulting) as a core academic function and responsibility;

developing strong research focal areas (and even formalised research units) around which staff members and postgraduate students collaborate and co-publish; and building strong and research-focused postgraduate programmes. Thus a department with a research-focused ethos and highly qualified staff members who could network, facilitated the development of a mature research culture.

The noted increase in quantity also had a perceived positive influence on research quality in general, as the following responses indicate:

*We want to be a world-class Economics Department. ...In the beginning it requires much input without much output, but after about four to five years the investment starts paying off as the PhD students start to graduate. ...We found that when we were hiring a substantial number of staff in 2009/2010, and we were looking in the international pool, having a large PhD programme was very beneficial, and attracted a much better cohort of candidates than had been the case otherwise. [Respondent 1 (R1)]*

*For us, this is about undertaking quality research, and training people to do the same. We like to do research, there are tons of interesting questions, but we cannot get to them all. So, PhD students can help us address a few more questions than we would be able to take on ourselves. [R3]*

The quality of PhDs produced, in particular, was also perceived by the HODs to be better than before. The indicators they used to qualify the improved quality output included the improved PhD student selection criteria, which could (in part) be related to selecting students whose research interests and background matched that of a department's research consortia. One particular HOD referred to an increase in PhD student numbers related to the establishment of such a research niche area as creating a catchment area for excellent students, with the added spin-off of creating a critical mass of students who could support each other.

In the quantitative data, we noted a marked increase in the proportion of PhDs by publication, and therefore enquired why this might be the case (Question 5). One of the HODs attributed this increase to international trends:

*This is a nod to the international market. It has been the norm in the US and Europe, where many of us trained, and, therefore, we have implemented it with many of our students. There are still students who are not 'built' to work that way, so we still have the more traditional 'book' PhD now and then. [R3]*

Interesting here is the use of 'market', which supports our earlier notion that economics departments may be characterised by a distinctive discipline-based culture that influences their practices.

Other possible reasons that HODs gave for an increase in the PhD by publication format within the departments studied were mainly attributed to the incentives that supervisors received for publications and the opportunities for wider dissemination of the work:

*At the end of the day, if it is not published, it is not done, or so the adage goes. [R1]*

*It seems like a more direct way to get the benefit of joint publications for supervisors. [R2]*

*To encourage and facilitate the publication and wider dissemination of the research results. [R4]*

Whilst the HODs did not refer to this consideration directly, the financial incentive for publication through the subsidy system (peculiar to the South African higher education system) may account, partly, for the

increase in PhDs by publication. The respondents did not see any direct financial benefit for the department from producing a PhD thesis alone:

*Not directly, but indirectly. We did not directly receive subsidy money. [R1]*

*The department has gradually benefitted from this, and the incentive to supervise students has now improved, but I do not know if this has made members of staff more willing to take on supervision. [R2]*

*Not in any way that we can see. [R3]*

*Indirectly, yes. [R4]*

The HODs were also asked (Question 2) to comment on the main institutional factors that, in their view, inhibited the production of larger numbers of PhD graduates from their departments. The lack of supervisory capacity seemed to be the main hampering factor reported in the case of the four departments studied:

*Supervisory capacity. We have quite a number of professors, but even so the distribution of the supervision load is fairly uneven. Some supervisors are overloaded. [R1]*

*The main institutional factor was the lack of a tradition of producing PhDs, the extent to which most of the top students went overseas to get their PhDs and a lack of willingness/capacity amongst some staff members to supervise PhDs. [R2]*

It seems that, once a department is able to establish a vibrant research culture, with enough doctorated staff members to sustain the research impetus, a tipping point is reached at which an increase in PhD production can be achieved and sustained.

Funding was also noted as a key deterrent for PhD studies, as students would not be able to study full-time without such support. Part-time studies were not seen as a viable option for many students, especially if they were already in positions of full-time employment (where a PhD in economics would not necessarily benefit them professionally).

Thus, the qualitative information shows that an increase in the quantity of economics PhDs was not accompanied by a concurrent decrease in the quality in doctoral education as much as it was accompanied by a change in departmental research management. Two changes stand out: the establishment of a research culture and the move to the PhD by publication. These management changes will be briefly discussed further.

In the four departments included in the study, national and international calls for increased PhD production coincided with recognition of the importance of establishing a research culture and prioritising research as an academic activity within economics departments. Wills et al.<sup>31</sup> underscore the importance of fostering a research culture, securing adequate time and funding for research, and having staff with PhDs who are productive in publishing early in their careers as essential elements for research productivity of accounting academics. Kyvik and Aksnes<sup>32</sup> found that better qualified academic staff, increased research collaboration, improved research conditions, and incentive and reward systems all helped to explain an increase in research productivity at Norwegian universities. These elements were also highlighted by the HODs in our study as being drivers of both quantity of PhD output and quality in doctoral education in their economics departments.

The use of the PhD by publication format was indicated to be of special relevance to economics as a discipline, by both the literature review and the logit regression results. Callaghan<sup>33</sup> recommends this alignment of publication practices and higher degree requirements – thus the PhD by publication – as a way of building human capital to boost higher education research productivity. However, the use of the PhD by publication format addresses mainly the interests of the department, the supervisor and the doctoral candidate who aims to pursue an academic career, rather than the needs of those who come from and/or re-enter

non-academic jobs.<sup>25</sup> Moreover, the PhD by publication fundamentally requires expert supervisory support<sup>34</sup>, preferably given by supervisors engaged in publication themselves<sup>35</sup>.

If one takes into account the relatively low percentage of staff with doctorates at South African universities (including economics departments, as highlighted by the HODs in this study), it would seem that attempts to find suitably qualified supervisors to guide students following this format might be problematic if it becomes a requirement to bolster doctoral production. Despite these cautionary considerations, Stock and Siegfried<sup>25</sup> found that the PhD by publication could significantly decrease the time needed for completion of the doctorate. So while the PhD by publication might certainly hold advantages in terms of PhD production and building scholarship within economics in South Africa, it should not be seen as an 'easy way out'.<sup>36</sup> As is the case in Australia<sup>37</sup> and New Zealand,<sup>38</sup> South Africa also lacks a nationally consistent guideline on the quality and quantity parameters that define this PhD format, which leaves much room for (mis-)interpretation by academic departments, supervisors and examiners.

## Conclusion

We set out to explore if the departments of economics at the top four universities, as defined in this paper, responded to the call for increased doctoral production. If so, was there any increase at the expense of quality of doctoral education and did the PhD by publication play a role in any of these shifts?

The four economics departments and the commerce faculties at these universities are producing substantially more PhDs – thus quantity is increasing. The indicators gathered show the economics PhD group and the trends in the form of that groups' PhDs to be different from the rest of the commerce faculty in a way that can be interpreted as either positive or negative in terms of quality. This ambiguity necessitated the gathering of additional survey data. Former HODs of the economics departments supplied a plausible argument as to why the quality of doctoral education in these departments had improved: management changes to the process of economics PhD production. Such changes include the move to the PhD by publication, increased attention to ensuring the quality of students allowed into the PhD programmes, facilitation of full-time doctoral studies through funding arrangements, and the appointment of international faculty with a research orientation. We thus infer that increases in quantity did not necessarily have an adverse influence on the quality of doctoral education.

Our quantitative data, and the absence of a generally accepted quantitative model that measures PhD thesis quality, did not allow us to make inferences about both quantity and quality of theses. This limitation to our study, at the same time, encourages researchers to develop such a model with quantitative indicators for PhD thesis quality.

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## Authors' contributions

Pd.J. was the lead author. Pd.J., L.F. and P.v.d.S. all contributed conceptually. Pd.J. collected the data and performed the quantitative analysis. L.F. performed the qualitative analysis. All authors contributed towards the final write-up.

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### **Appendix: Questionnaire sent to former heads of economics departments at four research-intensive universities in South Africa**

1. From a departmental perspective what is the primary motivation to graduate more doctoral students?
2. From a departmental perspective what is the main institutional factor that inhibits the graduation of more doctorates?
3. Did the quality of the doctorates produced 2008 to 2014 decrease, increase or stay the same? What indicator are you using to answer?
4. Did your department benefit from increased funding from your university when you graduated a doctoral student?
5. What motivated the increased use of the 'PhD by publication' in your department?
6. Do you think that your department has a mature research culture?
7. If so, what was the main factor that contributed towards the establishment of a mature research culture in your department?

